



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,364	06/23/2003	Divya Chopra	DC8516 US NA	2771
23906 7590 05/03/2007 E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805			EXAMINER LEWIS, BEN	
			ART UNIT 1745	PAPER NUMBER
			MAIL DATE 05/03/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/603,364

Applicant(s)

CHOPRA ET AL.

Examiner

Ben Lewis

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6,7,9,10,12,13,15,16 and 18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6,7,9,10,12,13,15,16 and 18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- ☐ Notice of Informal Patent Application
- ☐ Other: ____.

Detailed Action

1. The Applicant's amendment filed on February 12th, 2007 was received. Claims 1, 4, 7, 10, 13 and 16 were amended. Claims 2, 5, 8, 11, 14 and 17 were cancelled.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action (issued on October 10th, 2006).

Claim Rejections - 35 USC § 103

3. Claims 1,3,4,6, 7, 9-10, 12-13, 15-16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braun (U.S. Patent No. 6,451,471 B1) and further in view of Yamada et al. (U.S. Patent No. 6,500,893 B2).

With respect to claims 1,3,4,6, 7, 9-10 and 12, Braun discloses a conductivity fuel cell collector plate and method of fabrication (title) wherein, the invention relates to conductive polymer composite structures and methods for their manufacture. More particularly, the invention relates to injection or compression molded conductive polymer compositions and techniques for their manufacture (Col 1 lines 15-25). Braun teaches that referring to FIG. 2, a cross-sectional view of an injection molded collector plate shows the molded surface layer and the portion of the land surfaces to be removed in accordance with the present invention. After molding, a polymer-rich surface layer 5

Art Unit: 1745

covers the land surfaces of the collector plate. After removal of the surface material, the land areas are reduced to a height 6. (In order to determine how much material was removed, a measurement of the startup thickness must have been made). Significantly, the channel walls 7 of the collector plate retain their polymer rich surface layers, while the newly formed land areas generally provide filler rich concentration similar to that of the bulk 8 of the collector plate. Simply stated, 0.001-0.5 cm, and ideally 0.015-0.06 cm, of the molded surface from the land areas of the plate is removed using machining, surface grinding, sanding or similar operation, in a manner that ensures a high level of flatness and parallelism in the finished plate. After the grinding operation, the land areas have the optimum height required for fuel cell operation. This height is typically between 0.05 and 0.15 cm, but may be less than 0.05 cm in certain designs. By removing the resin-rich layer from the projections on the plate, the resulting land surfaces contain a higher filler content than the surfaces of the original injection molded article, leading to higher electrical and thermal conductivity. The channel surfaces contain the polymer rich layer developed during the injection molding process, providing high mechanical strength, excellent barrier properties, erosion and chemical resistance, as well as hydrophobicity. (Col 4 lines 33-54).

Braun also disclose wherein the graphite is a powder and wherein the graphite is a fiber (See Braun, claims 13-16)

Braun does not specifically teach the percentage of plastic or graphite fiber or powder to form the current collector plate. However, Yamada et al. discloses a resin composition (title) wherein, the resin composition of the present invention contains, as

Art Unit: 1745

another essential ingredient, at least one filler selected from the group consisting of graphite, ketjen black, acetylene black, furnace carbon black and thermal carbon black. By the use of such a carbon type electrically conductive filler, the composition has heightened corrosion resistance and moreover, side reactions can be prevented when it is used as a fuel cell separator or sealing material (Col 6 lines 25-34). The resin composition of the present invention generally contains the resin A), filler B) and fiber C) in an amount of from 10 to 70% by weight, from 40 to 90% by weight, and from 0 to 40% by weight, respectively, based on the total amount of the resin composition (Col 7 lines 60-67). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the composition of resin, filler and fiber of Yamada et al. in the fabrication of the separator plate of Braun because Yamada et al teach that when the amount of the filler is less than 40 parts by weight, the sufficient electrical conductivity cannot be attained, while the amounts exceeding 900 parts by weight cause a problem in strength or molding (Col 6 lines 64-67).

With respect to the reduction in thickness of the current collector plate, the disclosure Braun as modified by Yamada differs from Applicant's claims in that Braun as modified by Yamada does not disclose wherein the thickness of the current collector plate is reduced by no more than the claimed amount. However, Braun as modified by Yamada recognized the need for removal of the polymer rich layer which would then decrease electrical resistance and increase desirable electrical conductivity. Braun as modified by Yamada teaches that by removing the resin-rich layer from the projections on the plate, the resulting land surfaces contain a higher filler content than the surfaces

Art Unit: 1745

of the original injection molded article, leading to higher electrical and thermal conductivity (Col 4 lines 33-54).

Therefore, it would have been within the skill of the ordinary artisan to remove the polymer rich layer in an amount necessary to provide desirable electrical conductivity. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art. In re Boesch*, CCPA 1980, 617 F.2d 272, 205 USPQ215.

With respect to claims 13,15-16 and 18, it is noted that claim 13-18 are product-by-process claims. "Even though product-by-process claims are limited by and defined by the process, determination of patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F. 2d 698,227 USPQ 964,966 (Fed Cir. 1985).

Response to Arguments

4. Applicant's arguments filed on February 12th, 2007 have been fully considered but they are not persuasive.

Applicant's principal arguments are

(a) In view of the teachings of the Braun patent, one skilled in the art would not expect that the electrical resistance of a composite current collector plate of a proton exchange

Art Unit: 1745

membrane fuel cell could be improved by removing a surface layer of no more than 5 microns as recited in amended independent claims 1.4, 7, 10, 13 and 16 of the present application. Contrary to the teachings of the Braun patent, applicants have found that the desired reduction in resistivity is achieved with the process of the invention by the time 4 micrometers have been removed from the surface of a composite plate comprised of 10 to 50 weight percent plastic, 10 to 70 weight percent graphite fiber filler and 0 to 80 weight percent graphite powder filler. This is quite a surprising result in View of file contrary teachings of the cited Braun patent.

(b) The Yamada patent has no disclosure suggesting a composite current collector plate of a proton exchange membrane fuel cell could be improved by removing a surface layer of the composite plate. According the invention recited in amended independent claims 1, 4, 7, 10, 13 and 16 is not rendered obvious by the combination to the Braun and Yamada patents.

In response to Applicant's arguments, please consider the following comments.

(a) and (b) With respect to the reduction in thickness of the current collector plate, the disclosure Braun as modified by Yamada differs from Applicant's claims in that Braun as modified by Yamada does not disclose wherein the thickness of the current collector plate is reduced by no more than the claimed amount. However, Braun as modified by Yamada recognized the need for removal of the polymer rich layer which

Art Unit: 1745

would then decrease electrical resistance and increase desirable electrical conductivity. Braun as modified by Yamada teaches that by removing the resin-rich layer from the projections on the plate, the resulting land surfaces contain a higher filler content than the surfaces of the original injection molded article, leading to higher electrical and thermal conductivity (Col 4 lines 33-54).

Therefore, it would have been within the skill of the ordinary artisan to remove the polymer rich layer in an amount necessary to provide desirable electrical conductivity. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art.* In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ215.

Although the reference discloses removing 10 microns, applicant have not demonstrated unexpected results for removing 5 microns versus removing 10 microns and note that removing 10 microns was disclosed as an embodiment of applicant's invention on page 5, lines 30-35 of the instant specification. It is also noted that Table 1 on page 8 of applicant's specification does not show unexpected results for removing 5 microns versus removing 10 microns. In In re Waymouth, 499 F.2d 1273, 1276, 182 USPQ 290, 293 (CCPA 1974), the court held that unexpected results for a claimed range as compared with the range disclosed in the prior art had been shown by a demonstration of "a marked improvement, over the results achieved under other ratios, as to be classified as a difference in kind, rather than one of degree." Table 1 of applicant's specification shows that removing 5 microns versus removing 10 microns results in a difference in degree in the drop of resistivity and removing 10 micron results in a higher drop of resistivity than removing 5 microns which is not unexpected.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745


SUSYTSANG-FOSTER
PRIMARY EXAMINER